White Paper:
Embedded Software Architecture SDK

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Summary

Ricoh's Embedded Software Architecture SDK (SDK/J) allows in-house developers, independent software vendors (ISVs) and systems integrators (SIs) to deliver customized Java-based solutions hosted on Ricoh MFPs and LPs. This robust software platform enables third parties to combine their own solutions with Ricoh's industry-leading hardware and extends Ricoh's leadership as the preferred document solution partner. This document describes the history, architecture, usage models, and development tools of this advanced technology from Ricoh.

History

Ricoh has lead the office equipment industry in providing solution platforms tailored for different customer requirements and segments. Since 2000, Ricoh adopted a standard UNIX-based architecture across its entire LPs and MFPs line. At that time, Ricoh had the future in mind and used these underpinnings to deliver a C-based solution development kit in 2002. Today Ricoh is augmenting this C-based API with a Java-based platform. Java was selected to support the rapid expansion of web-based solutions and services, to leverage the large number of engineers using the language, and to exploit the machine-independent Java architecture.

Functionality and Architecture

Ricoh's SDK/J allows the creation of embedded applications that will run on almost all Aficio MFPs and LPs. Since the SDK/J class libraries are standard across Ricoh's product line, it is possible for ISVs and SIs to deliver solutions to the market almost simultaneously with Ricoh's hardware launches. Ricoh is committed to maintaining the value of these solutions going forward through stability and backward compatibility in its Java offerings.

Embedded Software Architecture applications can control most aspects of the device operation panel as well as the device core capability such as printing, scanning and saving files. Classes are also provided for networking protocols, such as HTTP, FTP, SMTP, and SMB. Web services (SOAP+WSDL) also can be easily added via programmer-installable extension modules. The SDK/J architecture is shown in Figure 1.
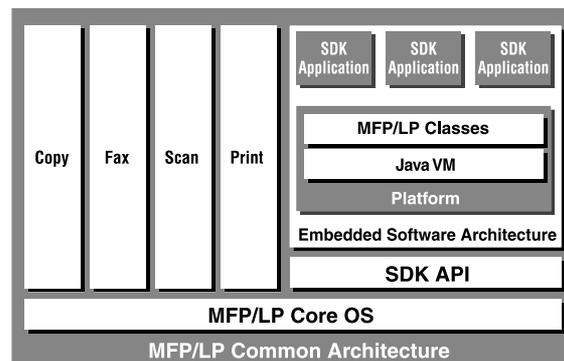

Figure 1: SDK/J Architecture

Types of Applications

Many types of SDK/J based solutions are possible. Some suggested applications are:

- **Panel Operation-Oriented "Thin Client"**

    This type of Java application uses the MFP as focal point for paper-based workflows. Examples include scan-to-server and print on demand.

- **Java Servlet Based Web Application**

    Web server applications such as device monitoring.

- **Background Application**

    Daemon-type of applications such as a web service print server.

And many more…the possibilities are only limited by your imagination!

APIs

The function APIs offer control over printing and scanning. The 'Print' package allows for printing of pictorial data, scanned through the MFP or transferred from the client terminal via the network. The 'Scan' package enables paper material scanned by the MFP to be saved as pictorial data with standard image formats, such as TIFF or JPEG.

SDK/J also has User Interface APIs such as "Panel" package. It consists of 9 major User Interface classes as follows:

- **Button class (button control)**
- **Buzzer class (buzzer control)**
- **Icon class (draw icons)**
- **Label class (draw line text)**
- **LED class (LED control)**
- **Message class (draw multi-line text)**
- **Pattern class (draw line and fill area with pattern)**
- **Soft Keyboard class (soft keyboard control)**
- **Window class (window control)**

Development Environment

SDK/J comes with the following components:

- **Install CD: MFP classes, emulator, sample programs, and online technical documents, including tutorial and JavaDoc API specifications.**
- **SD Card: Java VM, Foundation Classes and Application Loader**

The SDK/J applications can run on an emulator to test functionalities, such as LCD panel and scanning/printing, without an actual device. It can also emulate live network functions such as: FTP, HTTP, SMTP (e-mail), SMB, and web services.

Compatibility to J2SE

SDK/J supports Java 2 Micro Edition (J2ME), which is a subset of J2SE. The compatibilities between J2ME and J2SE are as follows:

- **Included in both J2SE and J2ME:**
    java.io
    java.lang

java.net

java.security

java.text

java.util

-Included in J2SE/ Partially included in J2ME:

java.math

- java.math.BigInteger – only supported in J2ME

- java.math.BigDecimal – not supported in J2ME

-non-J2SE Supported package

javax.microedition.io

Conclusion

Ricoh's SDK/J is a state-of-the-art solution application development environment. It uses the industry-standard Java language for ease of use, future growth and expandability. SDK/J shows Ricoh's commitment to deliver technology that helps move ideas forward.